WE CLAIM:

1. A method for attaching and/or maintaining primary liver cells comprising:

(a) providing a polymer surface comprising a CAR material to which one or more ECM proteins, and, optionally, one or more active factors, is bound, thereby forming a cell adhesion promoting surface; and

(b) incubating said liver cells in the presence of said surface in a medium that supports the growth and/or maintenance of said cells;

so that the liver cells attach and are maintained in a functional state.

2. The method of claim 1 wherein the ECM protein is selected from the group consisting of collagen I, collagen III, collagen IV, collagen VI, laminin, elastin vitronectin and fibronectin.

3. The method of claim 2 wherein the ECM is selected from the group consisting of elastin, collagen I, collagen IV, and collagen VI.

4. The method of claim 1 further comprising an active factor bound to the CAR material.

5. The method of claim 4 wherein the active factor is a polycationic polymer.

6. The method of claim 5 wherein the polycationic polymer is selected from the group consisting of polyethyleneimine (PEI), poly-D-lysine (PDL), poly-L-lysine (PLL), poly-D-ornithine (PDO) and poly-L-ornithine (PLO).

7. The method of claim 4 wherein the ECM protein and active factor are noncovalently bound.

8. The method of claim 4 wherein the ECM protein and active factor are covalently bound.

9. The method of claim 2 wherein the ECM proteins are elastin and collagen VI.

10. The method of claim 4 where the ECM protein is collagen I and the active factor is poly-L-ornithine.

11. The method of claim 4 where the ECM protein is collagen IV and the active factor is poly-L-ornithine.

12. The method of claim 1 wherein said CAR material is selected from the group consisting of hyaluronic acid (HA), alginic acid (AA), polyethylene glycol (PEG), polyethylene oxide (PEO), and polyhydroxyethyl methacrylate (poly-HEMA).

13. The method of claim 12 wherein the CAR material is HA.

14. The method of claim 1 wherein a modified ECM protein composition is in the form of a 3-dimensional (3D) scaffold.

15 The method of claim 1 wherein said modified polymer surface is in the form of a flexible material.

16. The method of claim 15 wherein the flexible material is a polydimethyl siloxane (PDMS) or other silicone-based polymer.

17. A cell culture grown by the method of claim 1.

18. The cell culture of claim 17 comprising human primary liver cells.

19. The cell culture of claim 17 wherein the ECM protein is selected from the group consisting of a collagen I, collagen III, collagen IV, collagen VI, laminin, elastin vitronectin and fibronectin.

20. The cell culture of claim 17 wherein the ECM is selected from the group consisting of elastin, collagen I, collagen IV and collagen VI.

21. The culture of claim 17 further comprising an active factor bound to the CAR surface.

22. The culture of claim 21 wherein the active factor is a polycationic polymer.

23. The culture of claim 22 wherein the polycationic polymer is selected from the group consisting of polyethyleneimine (PEI), poly-D-lysine (PDL), poly-L-lysine (PLL), poly-D-ornithine (PDO) and poly-L-ornithine (PLO).

24. The culture of claim 21 wherein the ECM protein and active factor are noncovalently bound to the CAR surface.

25. The method of claim 21 wherein the ECM protein and active factor are covalently bound to the CAR surface.

26. The method of claim 21 wherein the ECM proteins are elastin and collagen VI.

27. The culture of claim 21 wherein the ECM protein is collagen I and the active factor is poly-L-ornithine.

28. The culture of claim 21 wherein the ECM protein is collagen IV and the active factor is poly-L-ornithine.

29. A method of screening a test agent for its effect on cellular function of liver cells, said method comprising the steps of:

(a) providing a polymer surface comprising a CAR material to which one or more ECM proteins are bound, thereby forming a cell adhesion promoting surface;

(b) culturing said liver cells on said surface in a medium that supports the growth/maintenance of said cells, wherein a test agent is included in the medium or bound to the surface;

(c) determining the number of viable [functional, adherent] cells; and

(d) comparing the number of viable cells with the number in an identical culture carried out in the absence of said test agent;

wherein an increased number of viable cells in the presence of the test agent indicates that said agent promotes/enhances cellular function, and a decrease indicates that said agent retards/inhibits cellular function.

30. The method of claim 29 wherein said CAR surface comprises a CAR material selected from the group consisting of HA, AA, PEG and poly-HEMA

31. The method of claim 30 wherein said CAR material is HA.

32. The method of claim 29 wherein said CAR surface is a 3D matrix scaffold.

33. The method of claim 29 wherein said CAR surface is in the form of a flexible material.

34. The method of claim 1 wherein said liver cells are contained in or on a device or scaffold suitable for cell therapy.

35. A method for producing an ECM composition useful for selective cell attachment and function maintenance, comprising the step of applying to a CAR surface with one or more ECM proteins and an active factor, that promote cell attachment and function maintenance so that said proteins and active factors become covalently bonded thereto, thereby producing said ECM-modified polymer composition.

36. A method for producing an ECM-modified polymer composition useful for selective cell attachment andfunction, comprising the steps of:

(a) providing a polymer surface;

(b) treating said surface to produce a CAR surface;

(c) treating said CAR surface at least one ECM protein, and optionally, an active factor, that promote cell attachment and function so that said protein(s) and active factor(s) become covalently bonded thereto,

thereby producing said ECM-modified polymer composition.

37. A cell adhesion promoting (CAP) ECM-modified composition useful for promoting liver cell attachment or function maintenance, comprising a polymer surface made of/with a cell adhesion resistant (CAR) material to which one or more extracellular matrix (ECM) proteins are covalently bound, forming a-modified CAP surface, which proteins/surface promote[s]:

(a) attachment of cells, which cells substantially do not attach to said CAR surface in the absence of said peptides and,

(b) optionally, maintenance of function of cells that have attached to the ECM-modified surface, which cells substantially do not maintain function on said CAR surface in the absence of said peptides.

38. The composition of claim 37 wherein the ECM protein is selected from the group consisting of collagen I, collagen III, collagen IV, collagen VI, laminin, elastin vitronectin and fibronectin.

39. The composition of claim 37 wherein the ECM is selected from the group consisting of elastin, collagen I, collagen IV, collagen VI.

40. The composition of claim 37 wherein an active factor is attached to/bound the CAR surface.

41. The composition of claim 40 wherein the active factor is a polycationic polymer.

42. The composition of claim 41 wherein the polycationic polymer is is selected from the group consisting of polyethyleneimine (PEI), poly-D-lysine (PDL), poly-L-lysine (PLL), poly-D-ornithine (PDO) and poly-L-ornithine (PLO).

43. The composition of claim 37 wherein the ECM protein and active factor are noncovalently bound to the CAR surface.

44. The composition of claim 37 wherein the ECM protein and active factor are covalently bound to the CAR surface.

45. The composition of claim 37 wherein the ECM proteins are elastin and collagen VI.

46. The composition of claim 42 wherein the ECM protein is collagen I and the active factor is poly-L-ornithine.

47. The composition of claim 42 wherein the ECM protein is collagen IV and the active factor is poly-L-ornithine.

48. The composition of claim 37 wherein said CAR material is selected from the group consisting of hyaluronic acid (HA), alginic acid (AA), polyethylene glycol (PEG), polyethylene oxide (PEO), and polyhydroxyethyl methacrylate (poly-HEMA).

49. The composition of claim 49 wherein said CAR material is HA.

50. The composition of claim 37 wherein said modified ECM composition is in the form of a 3-dimensional (3D) scaffold.

51. The composition of claim 37 wherein said modified polymer surface is in the form of a flexible material.

52. The composition of claim 37 wherein the flexible material is a polydimethyl siloxane (PDMS) or another silicone-based polymer.

53. A method for attaching cells to an ECM-modified CAR polymer surface comprising:

(a) providing the composition of claim 37;

(b) contacting adherent cells with said composition; and

(c) allowing said cells to attach to said ECM-modified surface.

57. A method for attaching and/or maintaining primary liver cells comprising:

(a) providing a polymer surface comprising a CAR material to which Collagen I and poly-L-ornithine are bound, thereby forming a cell adhesion promoting surface; and;

(b) incubating said liver cells in the presence of said surface in a medium that supports the growth and/or maintenance of said cells;

so that the liver cells are maintained in a functional state.

54. A method for attaching and/or maintaining primary liver cells comprising:

(a) providing a polymer surface comprising a CAR material to which Collagen IV and poly-L-ornithine are bound, thereby forming a cell adhesion promoting surface; and;

(b) incubating said liver cells in the presence of said surface in a medium that supports the growth and/or maintenance of said cells;

so that the liver cells are maintained in a functional state.

55. A method for attaching and/or maintaining primary liver cells comprising:

(a) providing a polymer surface comprising a CAR material to which Collagen VI and elastin are bound, thereby forming a cell adhesion promoting surface; and;

(b) incubating said liver cells in the presence of said surface in a medium that supports the growth and/or maintenance of said cells;

so that the liver cells are maintained in a functional state.

56. The cell culture of claim 15 that is a culture of rat primary liver cells or human primary liver cells.

57. The method of claim 1 wherein the cells are rat primary liver cells or human primary liver cells.